



# Current Activities and Pedology Research at the Univ. of Maryland

Martin Rabenhorst



DEPARTMENT OF ENVIRONMENTAL  
SCIENCE & TECHNOLOGY  
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The background of the slide is a photograph of a soil profile. A measuring tape is visible on the left side, with markings for 0 and 1 1/2. The soil is dark and appears to be a sulfidic soil, with some lighter, more crystalline material visible in the upper layers.

# 8<sup>th</sup> International Acid Sulfate Soils Conference

- July 17-23, 2016 in College Park MD
- 70 Technical Presentation
- 3 Field Tours



# **Subaqueous soils of the Rhode River Subestuary of Chesapeake Bay**

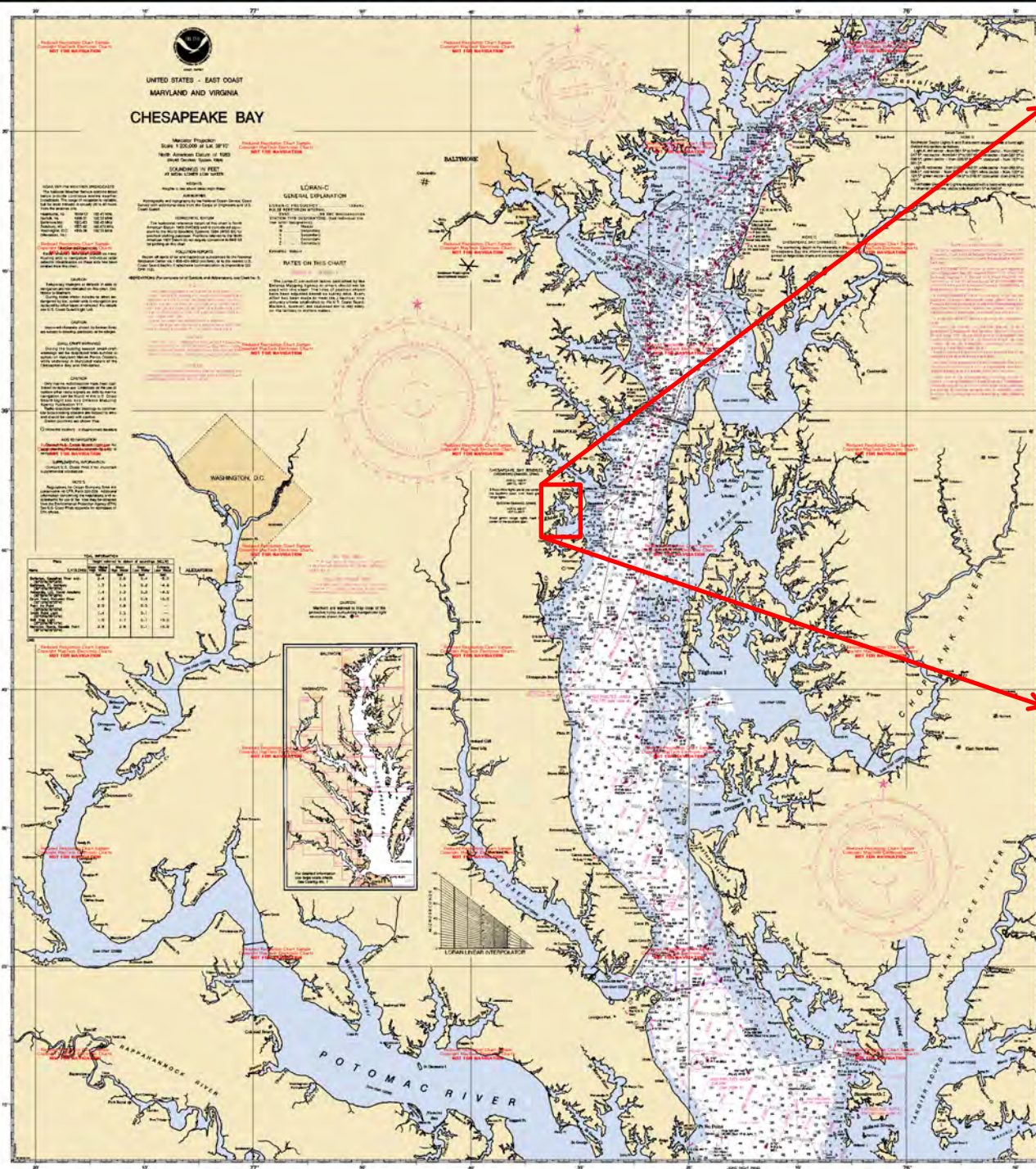
**Barret Wessel, Martin Rabenhorst**

***University of Maryland***

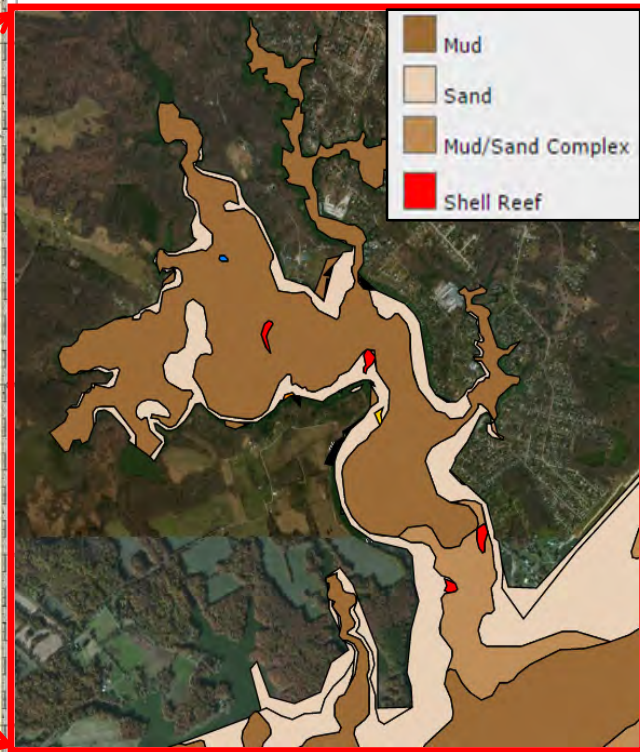


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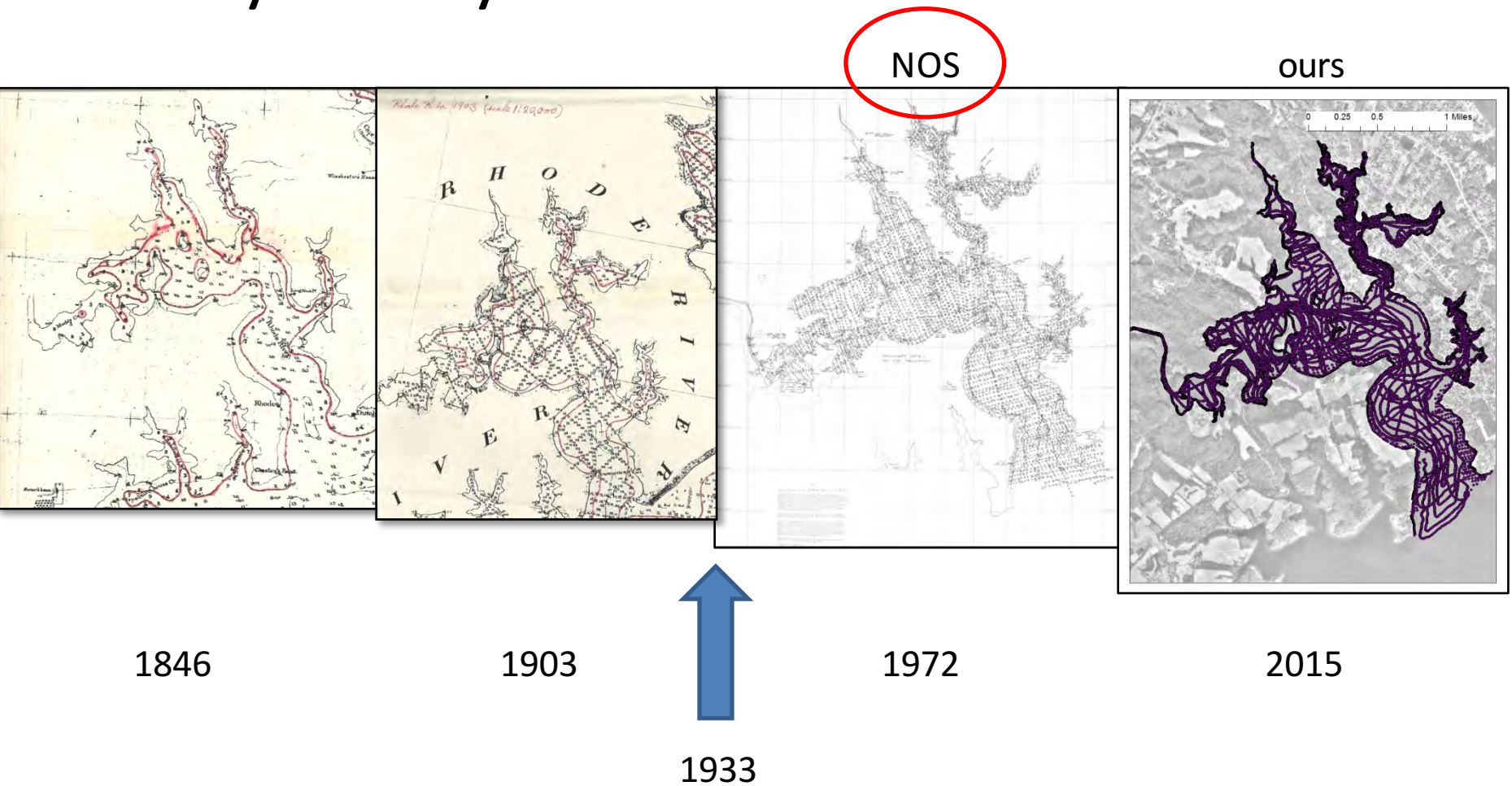


First efforts in Chesapeake Bay



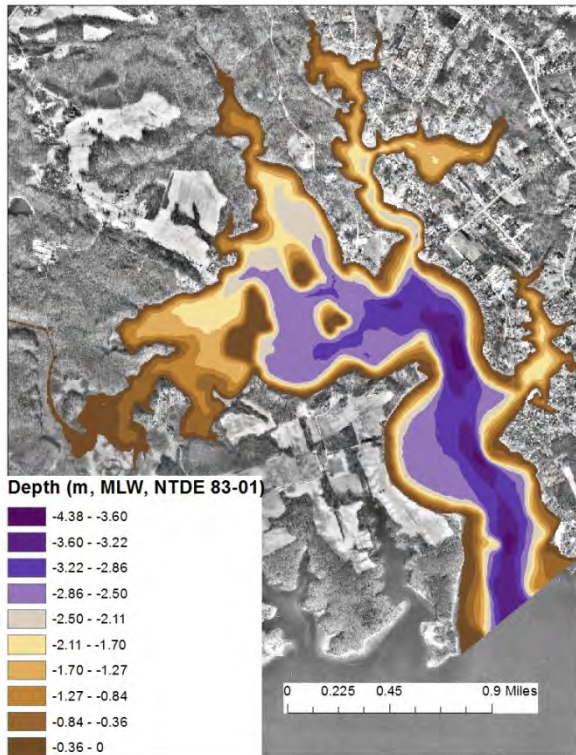


# Bathymetry

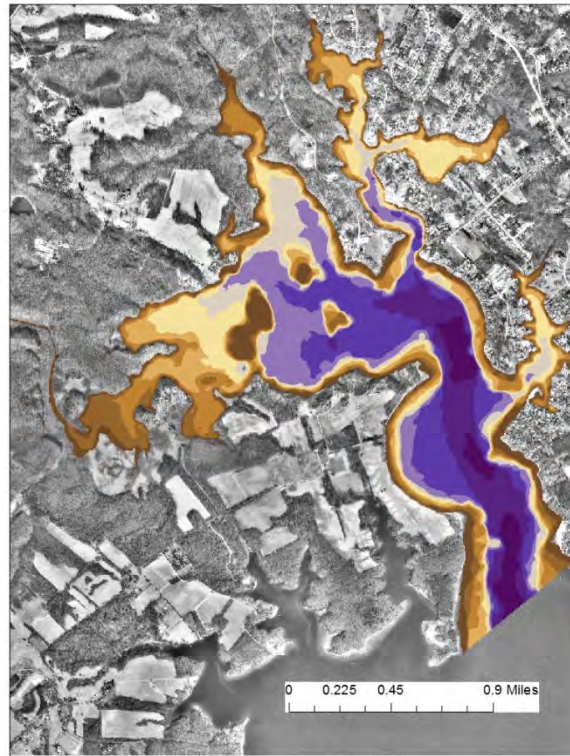


# Digital Elevation Models

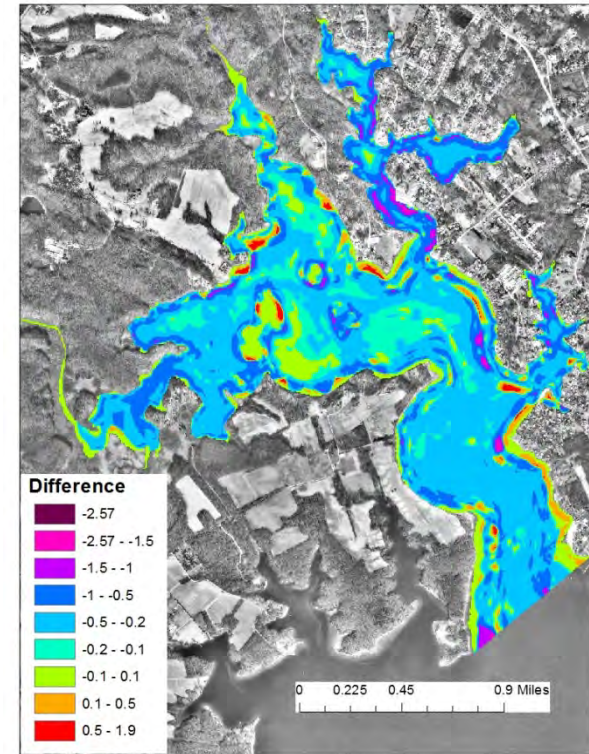
1972



2015



Difference



?

Measurement error must be taken into account

1972 +/- 15 cm

2015 +/- 2 or 3 cm?

Little change, but generally deeper!

Dewatering of Holocene sediment, scour, error? Unknown.

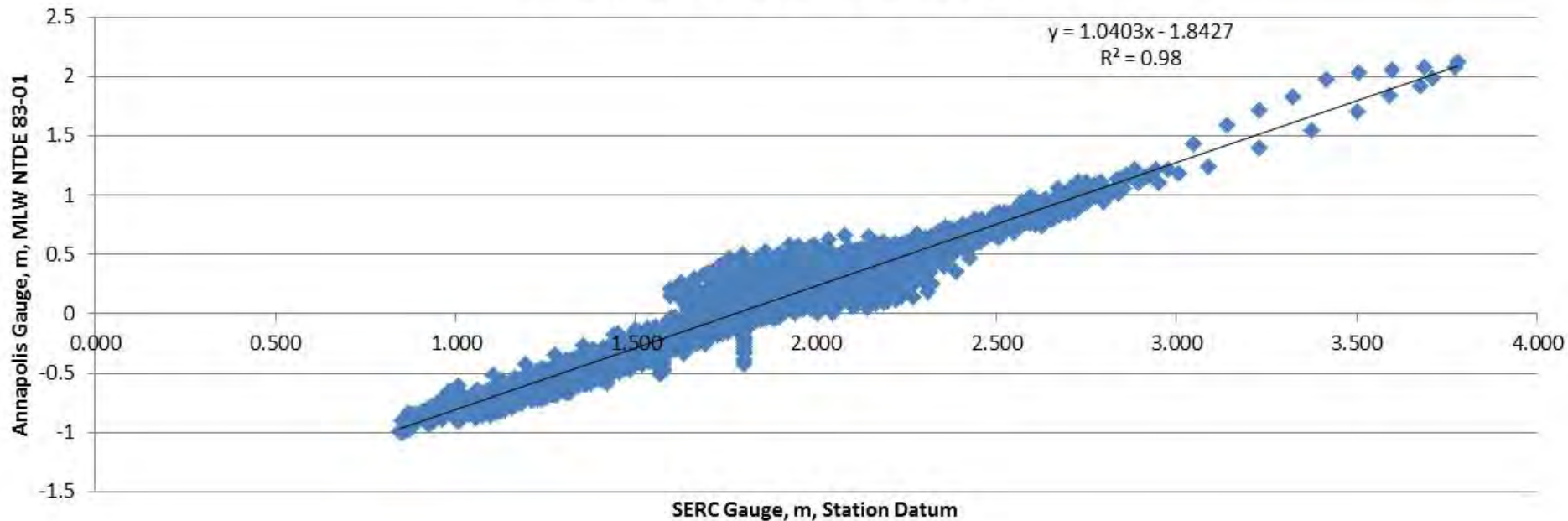
# Issues with Datums

## Stable Vertical References for Bathymetric Data

- Datums – NAVD88, NGVD29 – USGS not NOAA
- Not an issue if just dealing with geomorphology
- Not a huge issue if you simply want bathymetry
- Is a big issue if you want to compare bathymetry over time – the complications of rising sea level

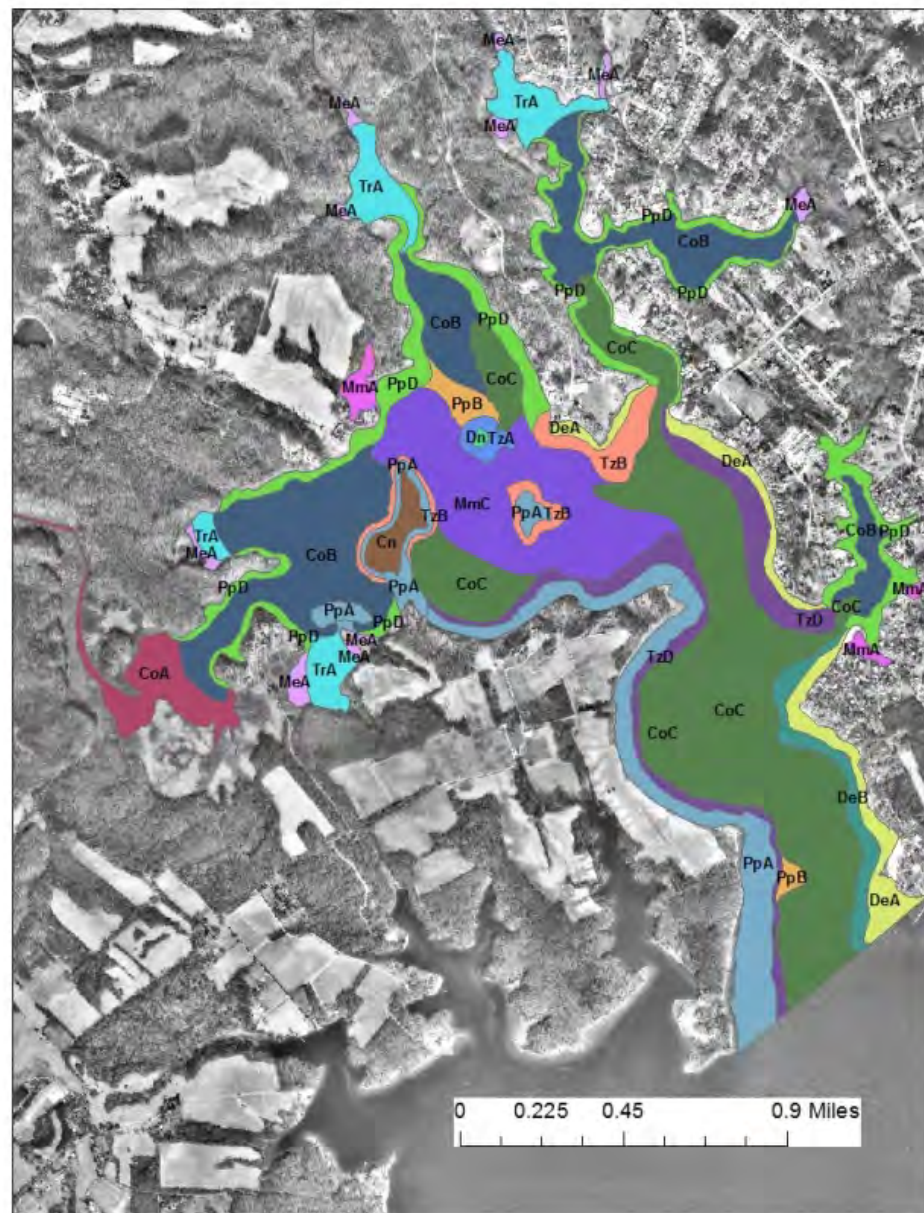
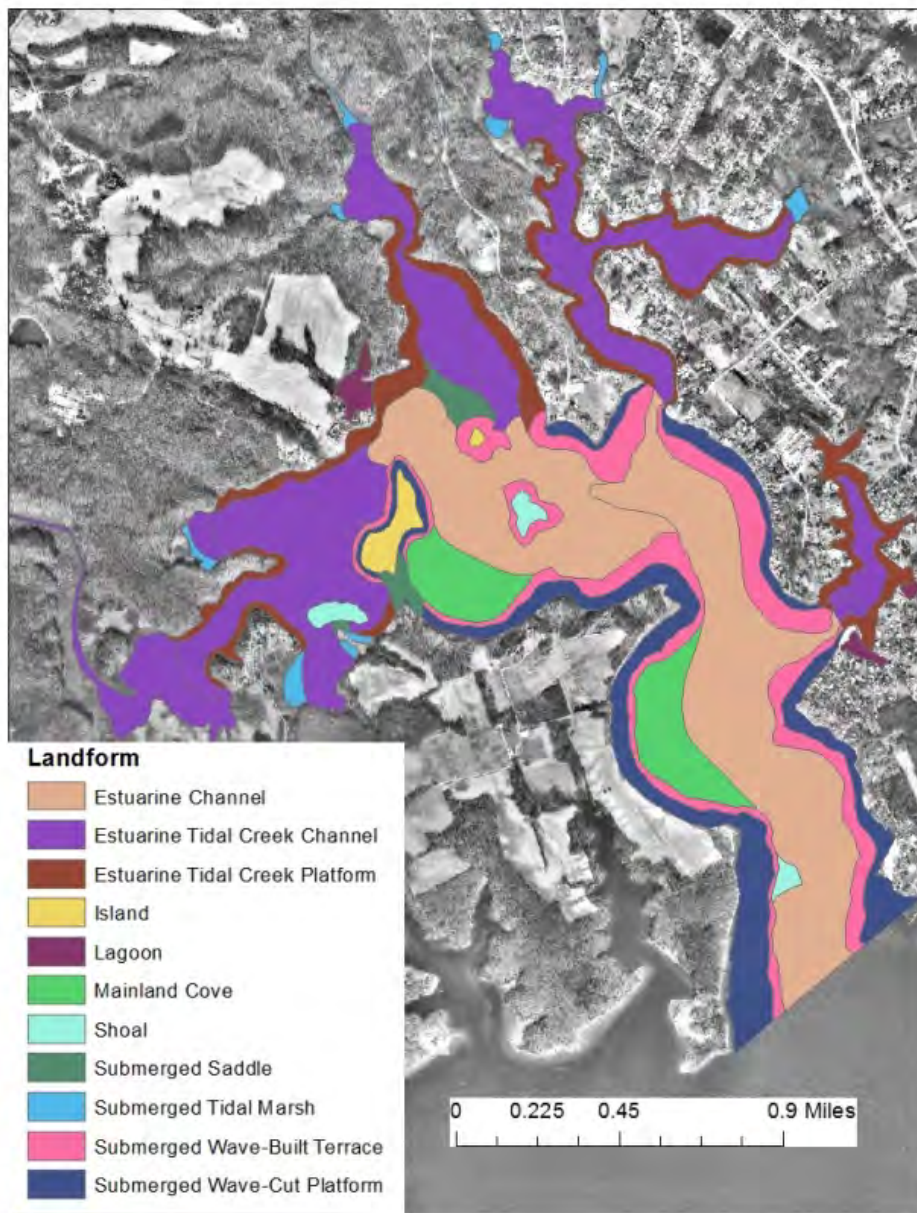


## Annapolis vs SERC Tide Gauges



- Most Bathymetric data not tied to a datum
- Compared SERC (Rhode River) with NOAA gauge is in Annapolis
  - ~8 miles away – uses NTDE 83-01
- N=130,413, hourly values from 1999-2015
- Good correlation







# Key to series (tax.) of the Rhode River

- Is the soil a Histosol?
  - Yes- **Metedeconk**
  - No- Highly fluid and fine textured throughout upper 2 m?
    - Yes- **Coards**
    - No- Buried organic horizons between 1-2 m?
      - Yes- **Truitt**
      - No- Moderately fluid within top 1 m, nonfluid from 1-2 m?
        - Yes- **Middelmoor**
        - No- Nonfluid sands and loamy sands throughout top 2 m?
          - Yes- **Demas**
          - No- Lithologic discontinuity within upper 50 cm with sandy horizons overlying pre-Holocene material?
            - Yes- **Pasture Point**
            - No- Lithologic discontinuity from 50-100 cm with sandy horizons overlying pre-Holocene material?
              - Yes- **Tizzard**
              - No-Unknown
  - Need new series
  - Very different salinity
  - Different underlying materials (present in some profiles)





# Occurrence and Distribution of F21 Problematic Red Parent Material Soils

S.C. Mack, M.C. Rabenhorst – UMD  
Jacob Berkowitz – USACE, Vicksburg, MS  
In Cooperation w/ USACE and USDA-NRCS



# Objective

- Create national and regional guidance maps
  - distribution of problematic RPM
  - improved hydric soil (and wetland) delineations



# Methods: Sampling & Mapping

- National solicitation of potential RPM soils (NRCS, USACOE, and KSSL laboratory)
- Soil Sampling
  - By field scientists (basic info)
  - From KSSL, Lincoln
- Samples analyzed for CCPI - Rabenhorst & Parihk (2000)
- Data linked to
  - Series
  - “associated series”
  - NRCS STATSGO/SSURGO datasets
  - lithology; / USGS geological available datasets

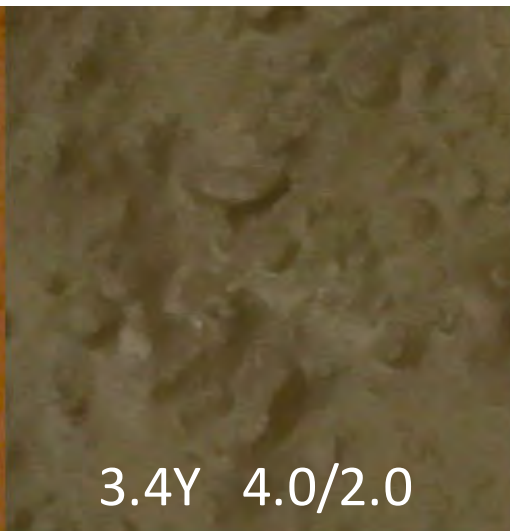


0 HR

1 HR

4 HR @ 80°C

Myersville



Not Problematic

Reaville



Problematic

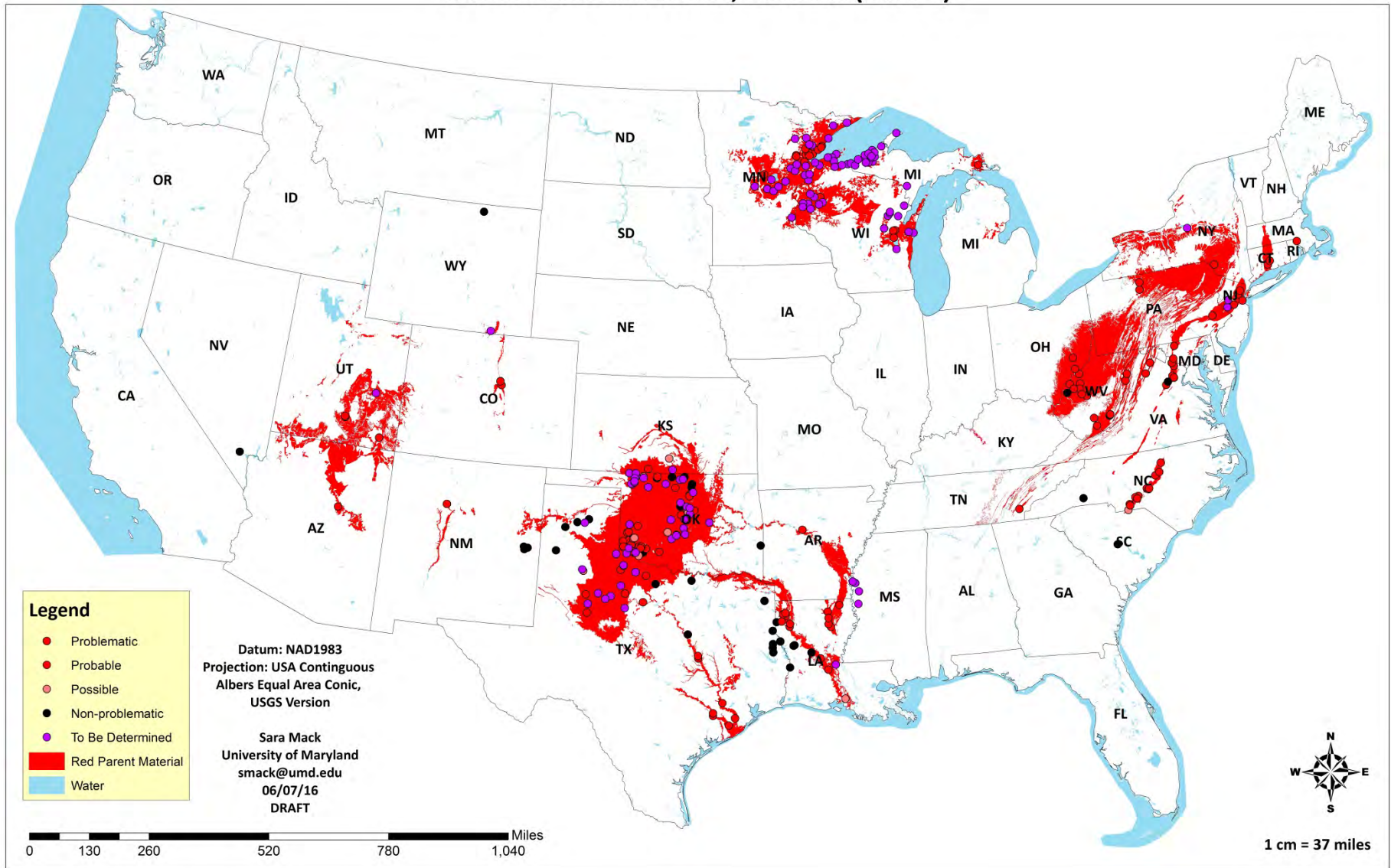


# Progress

- Responses from about 60 individuals and groups
  - NRCS
  - USACE
  - private sector soil/wetland scientists
  - KSSL
- Approx. 900 soil samples received
  - Representing 325 sites
  - Roughly 550 samples analyzed for CCPI
  - Other in process

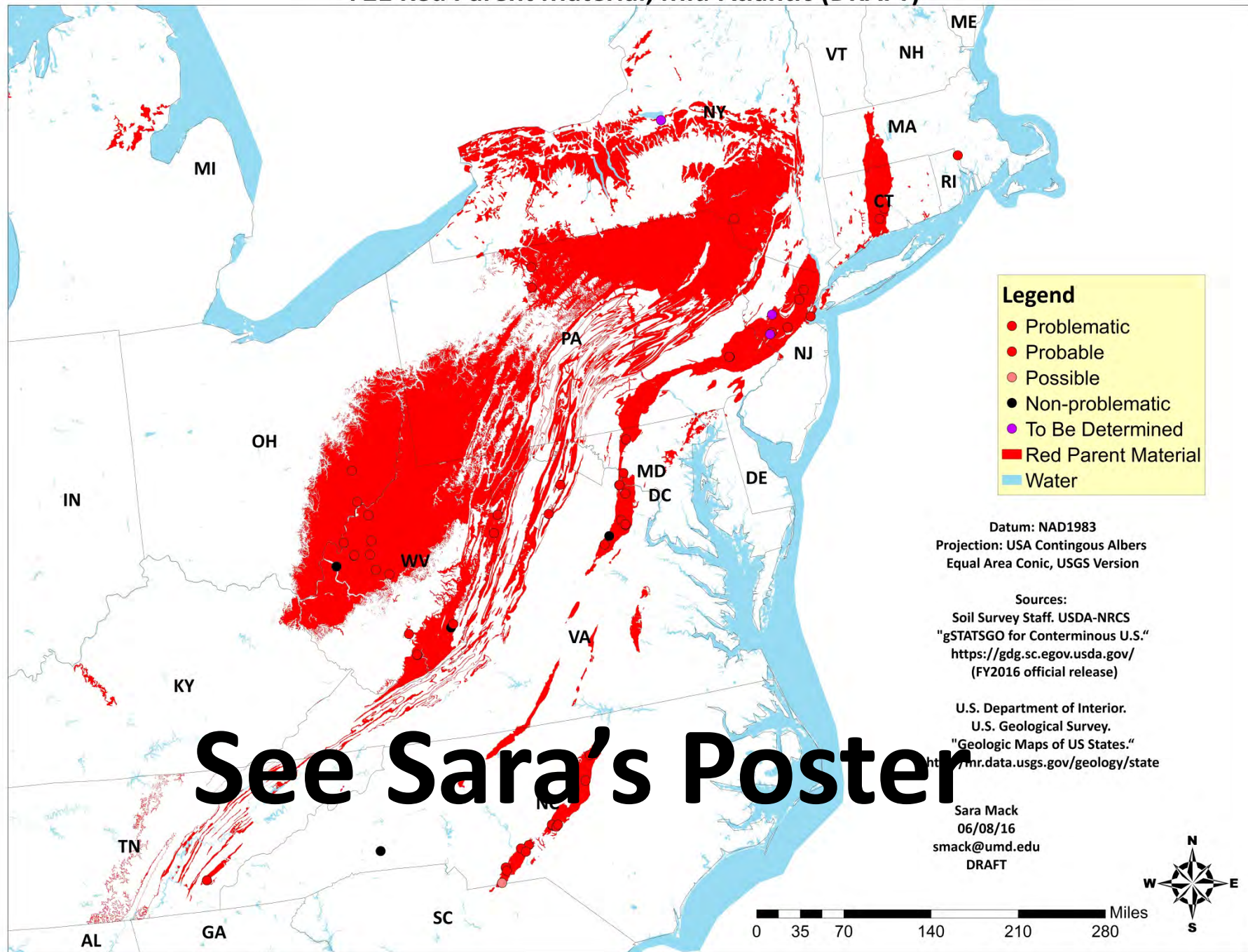


## F21 Red Parent Material, National (DRAFT)





## F21 Red Parent Material; Mid-Atlantic (DRAFT)







# Evaluation of Manganese Indicators of Reduction in Soil

Kristine Persing  
Martin Rabenhorst  
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Possible use of tubes coated with other minerals – Mn oxides?  
In principle a good idea, but there are issues in preparation  
Methods not available to produce a durable tube coating



Stiles, C.A., E. T. Dunkinson, C.L. Ping and J. Kidd. 2010. Initial Field Installation of Manganese Reduction Indicators in Soils (MRIS) in the Brooks Range, Alaska. *Soil Survey Horizons*, 51(4): 102-107.



# 2 years of development and testing





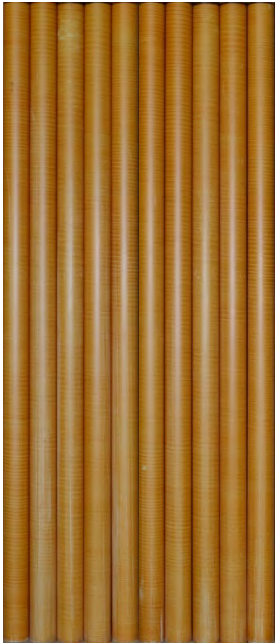


April-May 2015

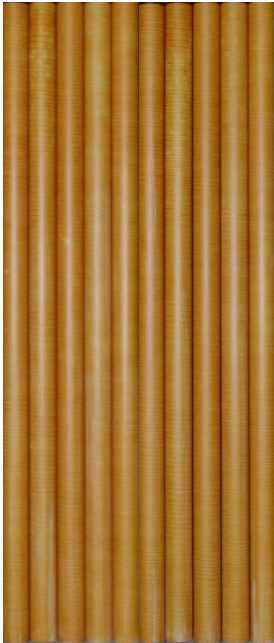




2d



4d



7d



14d



21d



28d



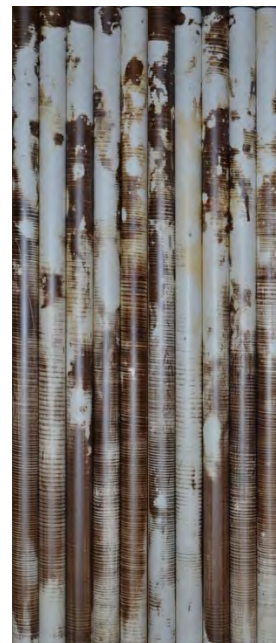
4/21 - 4/23



4/21 - 4/25



4/21 - 4/28



4/21 - 5/05



4/21 - 5/12



4/21 - 5/19



# March 2016 – Field Experiment 3 Site Transect

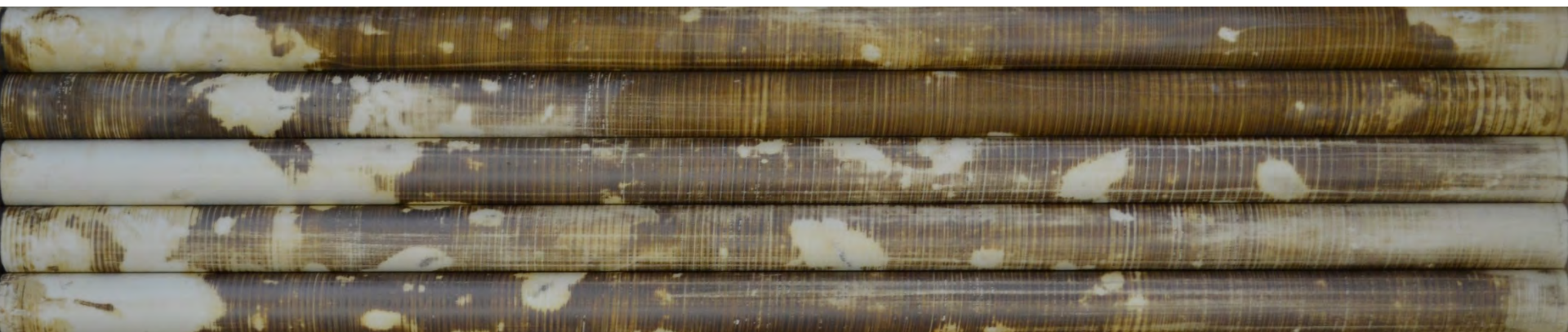




18 Day – Low Site



Surface  
←



Low Site  
18 days



# Unveiling in Phoenix

- Rabenhorst, M. C. 2016. ***Manganese Oxides as an Indicator of Reduction In Soils (IRIS)***. Soil Sci. Soc. Am. Annual Meeting, Nov. 6-9, 2016. Phoenix, AZ. (Poster)

How to make the Mn oxide paint and tubes

- Persing, K. A. and M. C. Rabenhorst. 2016. ***Evaluation of Manganese Indicators of Reduction in Soil (IRIS)***. Soil Sci. Soc. Am. Annual Meeting, Nov. 6-9, 2016. Phoenix, AZ. (Poster)

Evaluation of tubes performance: relative to Fe coated tubes; Eh etc.

- Rabenhorst, M. C. and J. E. Post. 2016. ***A mineralogical journey in pursuit of a durable manganese oxide coating for environmental assessment***. Soil Sci. Soc. Am. Annual Meeting, Nov. 6-9, 2016. Phoenix, AZ. (Oral Paper)

What is going on mineralogically – a very interesting story